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IMPROVED RETAINING TEETH STRUCTURE FOR A RATCHETING WRENCH

A conventional ratcheting wrench, e.g., of the type shown in Fig. 1, includes a gourd-like frame (10) in which left and right retaining plates (11) are mounted. Two springs (12) are mounted between the respective retaining plate (11) and the frame (10), biasing the respective retaining plate (11) inward. A push block (13) is mounted between the retaining plates (11), and a switch member (14) extends from a lower end of the push block (13). The switch member (14) and the push block (13) can be turned to a position pressing against the respective retaining plate (11) facing the push block (13), allowing the ratchet wheel (15) to turn in a single direction. The ratchet wheel (15) can only turn outward to push the associated retaining plate (11) away, and inward rotation of the ratchet wheel (15) is stopped by the associated retaining plate (11), prohibiting reverse operation. The main drawbacks of this ratcheting wrench include there are too many elements involved, the operation is complicated, the space required for installation is relatively large, and malfunction resulting from deterioration of the elasticity of the springs is apt to occur.

Another ratcheting wrench has been developed. As shown in Fig. 2, the ratcheting wrench includes a circular frame (20) in which a catch (21) is mounted. The catch (21) is substantially triangular and includes two tooth points (211) branching leftward and rightward from a front end thereof, with a lobe (212) protruding from each of two sides thereof, the lobe being turning for controlling direction. A central pin (22) is pivoted to a central portion of the catch (21) so that the catch (21) may pivot about the central pin (22). A rear edge (213) of the catch (21) tapers rearward to form a sharp cone. A blind hole (23) is provided and receives a spring (24) for biasing a ball (25) to press against a side of the rear edge (213) of the catch (21). The respective lobe (212) can be moved to control the turning direction of the catch (21) and to make the ball press against the respective side of the catch, providing a positioning effect for the tooth point (211). The ratchet wheel (26) can turn outward while pressing against the

associated tooth point (211). Inward rotation of the ratchet wheel is prohibited by the associated tooth point (211), as a tangential direction of the rotational movement of the ratchet wheel (26) is directed toward the central pin (22). A reverse operation-prohibiting effect is thus provided. The main drawback of this ratcheting wrench is that the stress concentrates on a single tooth point (211) such that wear, breakage, or damage of the tooth point (211) occurs easily if the operational force is too large. The ratchet wheel (26) also tends to wear, resulting in malfunction of the ratcheting wrench.

Hence, the present invention provides an improved retaining teeth structure for a ratcheting wrench, in which the single tooth of the catch is modified as plural teeth on left and right portions. Plural tooth points are engaged with plural ratchet teeth of the ratchet wheel for effectively distributing the torque such that the torque will concentrate neither on a single tooth point nor on a single tooth of the ratchet wheel. The overall torque bearable by the whole structure is increased and the life of the tool is prolonged without altering the outline, which are the main objects of the present invention.

Other objects and features of the present invention will be described with reference to the accompanying drawings.

Drawings:

Fig. 1 is a schematic view of a conventional ratcheting wrench having two retaining plates and a gourd-like frame.

Fig. 2 is a schematic view of another conventional ratcheting wrench having a single-tooth type catch.

Fig. 3 is a schematic view of the present invention.

Fig. 4 is a schematic view of another embodiment of the present invention.

Fig. 5 is a view illustrating operation of the present invention.

| | | |
|----------------------|------------------|-----------------|
| (10) frame | (213) rear edge | (34) bulge |
| (11) retaining plate | (22) central pin | (35) rear edge |
| (12) spring | (23) blind hole | (36) sharp cone |

- (13) push block (24) spring (40) ratchet wheel
 (14) switch member (25) ball (41) ratchet wheel tooth
 (15) ratchet wheel (26) ratchet wheel (50) frame
 (20) frame (30) catch body (51) blind hole
 5 (21) catch (31) pin hole (52) spring
 (211) tooth point (32) central pin (53) ball
 (212) lobe (33) tooth point

As illustrated in Fig. 3, the main structure of the present invention
 10 includes a catch body (30) having a pin hole (31) in a center thereof for pivotally
 receiving a central pin (32), allowing the catch body (31) to pivot about the
 central pin (32). A front end of the catch body is arcuate and conformable to the
 shape of the pin hole (31), avoiding impingement with the ratchet wheel (41)
 during rotation. The catch body (30) includes plural tooth points (33) respectively
 15 on left and right portions thereof and having the same tooth number. The plural
 tooth points (33) are arranged in an arcuate manner conforming to the arcuate
 outline of the ratchet wheel (40). Thus, each tooth point (33) effectively meshes
 with the ratchet wheel tooth (41) that contacts the tooth point (33). Each tooth
 point (33) has an appropriate inclining angle such that the engaging face between
 20 the ratchet tooth (41) and the tooth point (33) allows the torque-acting line to pass
 through the central pin (32). A lobe (34) extends outward from a portion between
 the respective tooth points (33) and the catch body (30). The respective lobe (34)
 extends out of the frame (50) for the user's turning for the purpose of controlling
 the rotating direction of the ratchet wheel (40). A rear edge (35) of the catch body
 25 (30) tapers rearward to form a sharp cone (36) at a distal end thereof.

Operation of the present invention is shown in Fig. 5. The catch body (30)
 is mounted in the frame (50) of the ratcheting wrench, and the central pin (32) is
 pivotally mounted. Then, a blind hole (51) is provided in a rear side of the central
 pin (32), and a spring (52) is mounted for biasing the ball (53) such that the ball
 30 (53) presses against a side of the rear edge (35) of the catch, providing a retaining
 effect for the tooth points (33) of the catch. The rear edge (34) can be moved to

turn the catch, causing the ball (53) to press against the other side of the rear edge (35), thereby controlling direction of the catch. At this time, the tooth points (33) of the catch mesh with the ratchet wheel teeth (41). If the ratchet wheel (40) rotates outward, it can push the tooth points (35) away and rotate smoothly. If the ratchet wheel (40) turns inward, since the torque-acting line on the engaging face between the ratchet wheel teeth (41) and the tooth points (33) passes through the central pin (32), the inward rotation of the ratchet wheel (40) is stopped by the tooth points (33). Since the torque from the ratchet wheel (40) is distributed to the plural tooth points (33) and plural ratchet wheel teeth (41), the acting force does not concentrate on a single portion which would cause damage. The overall working torque of the wrench is increased, and the life of the tool is prolonged. Further, since the torque-acting line passes through the central pin (32), torques that cause deviation or disengagement of the catch will not occur, providing reliable meshing.

15 Another embodiment of the invention is shown in Fig. 5, wherein the number of the tooth points can be changed according to need. The contact area can be increased, and the working torque is further dispersed. The wrench is thus more reliable and firmer.

Fig. 4
20 According to the above description, the present invention provides an innovative catch with plural tooth points. Through proper angle arrangement, the tooth points may reliably and firmly mesh with the ratchet wheel teeth. The wrench torque can be dispersed to the plural tooth points and plural ratchet wheel teeth. The overall working torque of the wrench is increased and the life of the tool is prolonged, which is a technical breakthrough to conventional ones. This is applicable to industry and meets the requirement of a utility model, and an application for patent is accordingly filed. It would be greatly appreciated if the Patent Office grants the patent.

30 The present invention has been described in detail. Nevertheless, the above description only refers to preferred embodiments of the present invention and cannot be deemed as a limitation to the present invention. All equivalent changes and modifications within the scope of the claims of the present invention

still fall within the scope of the patent granted to the present invention.

Claims:

1. An improved retaining teeth structure for a ratcheting wrench, mainly comprising a catch body having a pin hole in a center thereof for pivotally receiving a central pin such that the catch body may pivot about the central pin, a front end of the catch body being arcuate and conforming to the shape of the pin hole, the catch body including plural tooth points respectively on left and right portions thereof and having the same tooth number, a lobe extending outward from a portion between the respective tooth points and the catch body, the respective lobe extending out of a frame of the ratcheting wrench for a user's turning for the purpose of controlling a rotating direction of the ratchet wheel, a rear edge of the catch body tapering rearward to form a sharp cone at a distal end thereof, characterized in that:

said plural tooth points are arranged in an arcuate manner conforming to an arcuate outline of the ratchet wheel such that plural tooth points of the catch simultaneously mesh with plural ratchet wheel teeth to thereby disperse the torque, each tooth point has an appropriate inclining angle such that a torque-acting line on an engaging face between the ratchet tooth and the tooth point passes through the central pin, avoiding generation of torques that cause deviation or disengagement of the catch, providing a reliable meshing.

Abstract

The present invention relates to an improved retaining teeth structure in which the retaining plates and the switch member as well as the single tooth type catch of the conventional ratcheting wrenches controlling leftward/rightward
5 rotation of a drive column of a ratchet wheel are modified to a catch having plural tooth points. This avoids the drawback of easy breakage of the tooth point of the conventional catch. A better meshing state between the tooth points of the catch and the ratchet wheel teeth is provided, providing a greater working torque for the wrench. The durability of the wrench is improved without changing the outline of
10 the wrench.

公告本

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發明專利說明書

| | | |
|-------------|---------------|---------------|
| 一、發明 名稱 | 中 文 | 棘輪扳手止齒改良結構 |
| | 英 文 | |
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四、中文創作摘要(創作之名稱: 棘輪扳手止齒改良結構)

本創作係有關於一種「棘輪扳手止齒改良結構」，其將習式用於控制棘輪方頭左右旋動之頂齒片與切換鈕結構與單齒型之止回爪結構改良成具有複數型之止回爪，將習用者之止回爪頂齒尖易於折斷之缺點加以改良，並可具有較佳之止回爪頂齒尖與棘輪齒之咬合狀態，而能提供扳手一更大之工作扭力，使扳手之耐用性提高而無須更動其外形結構者。

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英文創作摘要(創作之名稱:)

五、創作說明 (1)

按，習用之棘輪扳手，有如第一圖所示者，係具有一葫蘆形之框體(10)，其內設有左右二頂齒片(11)，並以二彈簧(12)設於頂齒片(11)與框體(10)間，藉以將頂齒片(11)推向內側，二頂齒片(11)間另設有一推塊(13)，其下方延伸有一切換鈕(14)，可藉旋動切換鈕(14)控制推塊(13)之位置，並壓制該推塊(13)面對之頂齒片(11)，而使棘輪(15)可作單向之頂動，由於棘輪(15)僅能向外旋動以推開頂齒片(11)，向內則會為頂齒片(11)所阻，因而受到一抵制之止逆功效，其主要缺點在於組成之構件較多，操作過程複雜，且所需要之裝設空間較大，易受彈簧之彈力減弱而失效者；

因而衍生出另一種棘輪扳手結構，如第二圖所示，其係有一圓形之框體(20)，並以一止回爪(21)設於框體(20)中，該止回爪(21)係略呈一三角形而於前方左右各延伸出一頂齒尖(211)，其兩側各凸出一凸緣(212)以利於撥動控制方向，中央部位樞設一中心銷(22)，使其可以該中心銷(22)為軸而旋轉，該止回爪(21)後緣(213)係漸向後縮減成一尖錐狀，另以一盲孔(23)樞設一彈簧(24)，推持一鋼珠(25)以頂止於該止回爪(21)後緣(213)之一側，可藉撥動該凸緣(212)以控制止回爪(21)旋轉方向，並使鋼珠頂止於不同側，以提供頂齒尖(211)一定位之作用，該棘輪(26)可向其所頂觸之頂齒尖(211)作一向外之旋轉頂動，若欲向內旋轉則會因棘輪(26)旋轉之切線方向指向中心銷(22)而受到頂齒尖(211)之阻擋，故而會產生一逆止之

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五、創作說明 (2)

效果，其主要之缺點在於該結構之受力點將集中於該單一之頂齒尖(211)上，若操作用力過大很容易造成該頂齒尖(211)之磨損、折斷或崩壞，其棘輪(26)亦容易因而磨損，造成該棘輪扳手失效者。

職是，本創作係提供一種「棘輪扳手止齒改良結構」，主要係將該單齒之止回爪改良成具有左右複數齒型之構造，其與棘輪之棘齒作用時係同時以複數個頂齒尖與複數個棘輪齒相頂觸，可有效分散作用之扭力不使之集中於同一頂齒尖與棘輪齒上，而可增加整體結構所能承受之總合扭力，且能延長工具之使用壽命，又不需要變更外觀造形為本創作之主要目的者。

本創作之其他目的及特點，將參照附圖詳細說明如后者。

圖式：

第一圖係為習式具有頂齒片與葫蘆型外框之棘輪扳手示意圖。

第二圖係為習式具有單齒型止回爪之棘輪扳手示意圖。

第三圖係為本創作之結構示意圖。

第四圖係為本創作之另一施行範例示意圖。

第五圖係為本創作之操作示意圖。

(10) 框體

(213)後緣

(34)凸緣

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五、創作說明 (3)

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| (11) 頂齒片 | (22) 中心銷 | (35) 後緣 |
| (12) 彈簧 | (23) 盲孔 | (36) 尖錐 |
| (13) 推塊 | (24) 彈簧 | (40) 棘輪 |
| (14) 切換鈕 | (25) 鋼珠 | (41) 棘輪齒 |
| (15) 棘輪 | (26) 棘輪 | (50) 框體 |
| (20) 框體 | (30) 本體 | (51) 盲孔 |
| (21) 止回爪 | (31) 銷孔 | (52) 彈簧 |
| (211) 頂齒尖 | (32) 中心銷 | (53) 鋼珠 |
| (212) 凸緣 | (33) 頂齒尖 | |

本創作之主要結構，如第三圖所示，主要具有一止回爪本體 (30)，其中央設有一銷孔 (31)，以利於中心銷 (32) 之樞設，並可以之為軸而旋轉，其前方配合銷孔 (31) 之形狀而呈一圓弧形，並能於旋轉時避免與棘輪齒 (41) 相碰觸，其左、右側各設有一組相同數目之複數個頂齒尖 (33)，其係配合棘輪 (40) 之弧度而呈一弧形之排列，俾使每一頂齒尖 (33) 與棘輪齒 (41) 接觸時能得到一確實之咬合，且每一頂齒尖 (33) 係具有適當之傾斜角度，而使其與棘輪齒 (41) 之咬合面能使扭力作用線通過中心銷 (32)，該頂齒尖 (33) 與止回爪本體 (30) 間係向外側延伸一凸緣 (34)，其可伸出棘輪扳手框體 (50) 外以供使用者撥動之以控制棘輪 (40) 方頭旋動之方向，該本體 (30) 於後緣 (35) 兩側漸向內縮，最後於末端形成一尖錐 (36) 者。

本創作之操作方式，如第五圖所示，係將止回爪 (30)

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五、創作說明 (4)

裝設於棘輪扳手框體 (50) 中，並樞設一中心銷 (32)，其後方設有一盲孔 (51)，另樞設一彈簧 (52) 推頂一鋼珠 (53)，使該鋼珠 (53) 頂止於止回爪後緣 (35) 之一側，以使止回爪之頂齒尖 (33) 得一定位推持之效，並可藉撥動該凸緣 (34) 而使止回爪轉動，使鋼珠 (53) 推頂於後緣 (35) 另一側而能控制止回爪之方向者；此時該止回爪之頂齒尖 (33) 係與棘輪齒 (41) 相咬合，若棘輪 (40) 向外側旋轉則可順利頂動頂齒尖 (35) 而轉動，若棘輪 (40) 欲向內旋轉則將因作用於棘輪齒 (41) 與頂齒尖 (33) 之咬合面之作用力線通過中心銷 (32) 而受到頂齒尖 (33) 之阻擋，由於棘輪 (40) 之扭力作用於複數個頂齒尖 (33) 與複數個棘輪齒 (41) 上，將分散作用力而不會集中於某一部位造成破壞，因而能增加扳手整體之工作扭力，又可延長工具使用壽命者；

另其作用力線係通過中心銷 (32)，故而可避免產生導致止回爪偏移或脫離之力矩，而可獲得一種固咬合之效者。

本創作另一施行範例，如第五圖所示，係可視需求增設頂齒尖之數目，俾使接觸範圍更形擴大而能使工作扭力更加分散作用，進而使扳手更加堅固耐用者。

綜上所述，本創作具有創新之複數型頂齒尖止回爪結構，且利用其適當角度設計之頂齒尖而能與棘輪齒得到一確實穩固之咬合，又能分散扳手扭力作用於複數之頂齒尖與棘輪齒上，增加扳手整體之工作扭力並延長工具使用壽命，較之習用者可謂一突破性之進步，於產業上極具利用價值，顯已符合新型專利要件，爰依法申請之，如蒙 貴

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五、創作說明(5)

局惠予核准，至感德便。

以上已將本創作呈一詳細說明，惟以上所述者，僅為本創作之較佳施行範例而已，當不能限制本創作之實施範圍，凡依本創作申請專利範圍所作之均等變化與修飾等，皆應仍屬本創作之專利涵蓋範圍內者。

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六、申請專利範圍

一種「棘輪扳手止齒改良結構」，主要具備一止回爪本體，其中央設有一銷孔，以利於中心銷之樞設，並可以之為軸而旋轉，其前方配合銷孔之形狀而呈一圓弧形，其左、右側各設有一組相同數目之複數個頂齒尖，該頂齒尖與止回爪本體間係向外側延伸一凸緣，其可伸出棘輪扳手框體外以供使用者撥動之，以控制棘輪方頭旋動之方向，該本體於後緣兩側漸向內縮，最後於末端形成一尖錐形者；

其主要特徵在於：

該複數個頂齒尖係配合棘輪之弧度而呈一弧形之排列，而可使止回爪同時卡持複數個頂齒尖於複數個棘輪齒上，俾能分散扭力之作用，並使每一頂齒尖與棘輪齒接觸時能得到一確實之咬合，且每一頂齒尖係有一適當之傾斜角度，使其與棘輪齒咬合面之作用力線通過中心銷，而避免產生導致止回爪偏移或脫離之力矩，而可獲得一穩固之咬合狀態者。

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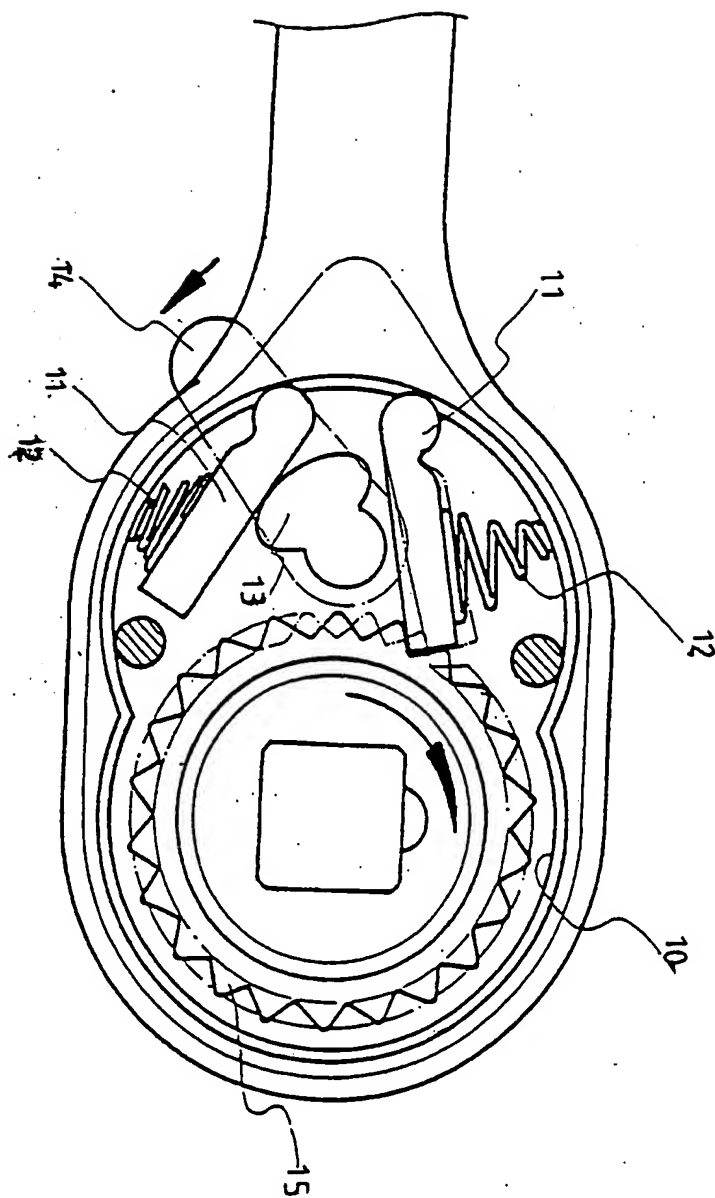
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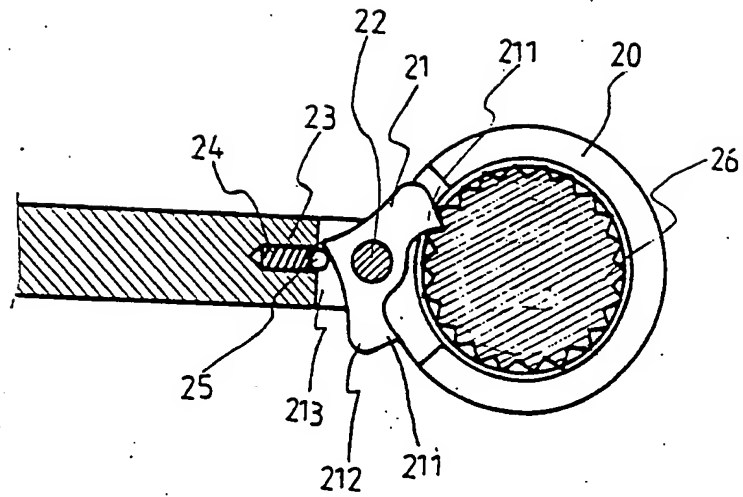
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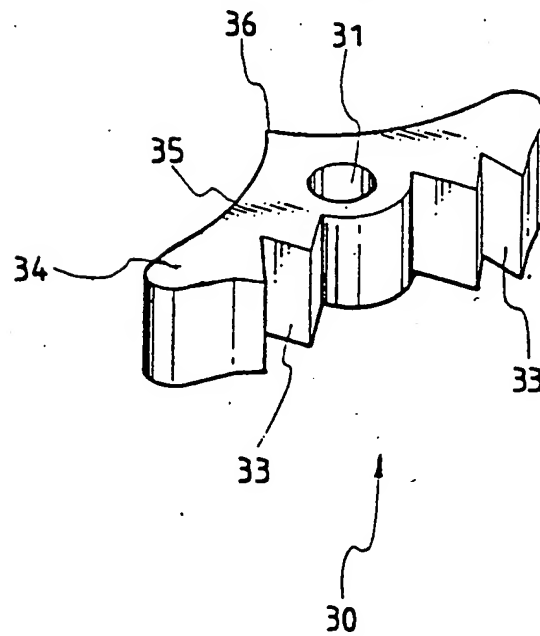
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第一圖



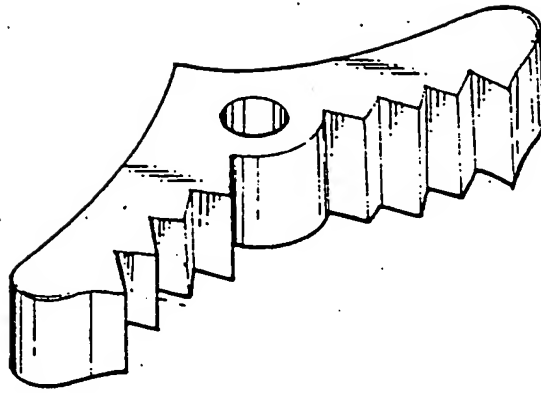


第二圖

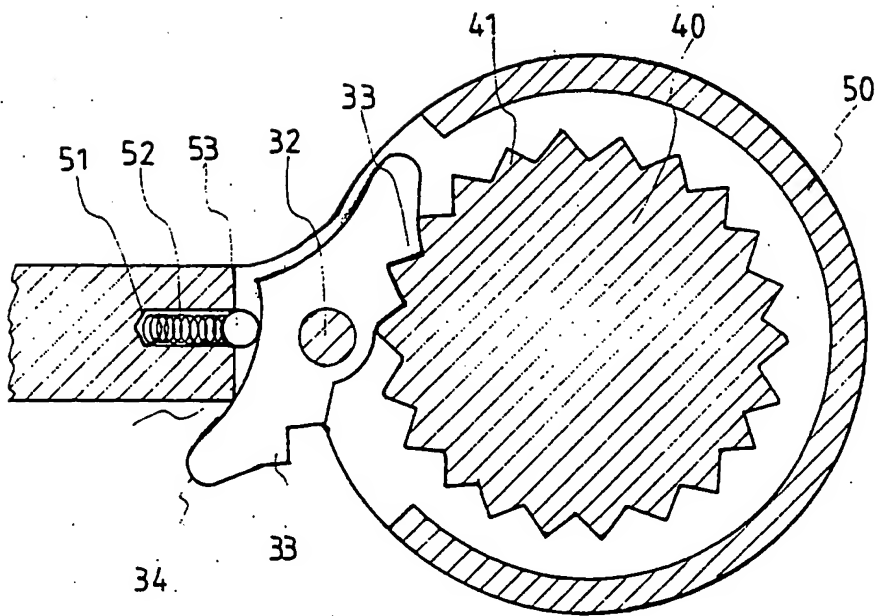


第三圖

310649



第四圖



第五圖